5700A/5720A

Series II Multi-Function Calibrator

Remote Programming Reference Guide

FLUKE®

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Reference Guide

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Syntax Rules

Spaces	Use at least one space between a command and a parameter. Do not use spaces within a parameter, or within a number.
Multiple Parameters	When a command has more than one parameter, separate the parameters with commas. For example: "OUT 1 V, 100 HZ".
Numeric Parameters	Parameters may have up to 255 significant figures. Exponents may range from -32000 to +32000. The useful range for 5720A programming is ± 2.2 E-308 to ± 1.8 E308.
Case Sensitivity	All lower case letters are converted to upper case except in quoted strings.
Extra Parameters	Avoid using extra parameters. Too many parameters will cause a command error.
Null Parameters	Null parameters will cause a command error (e.g., adjacent commas in "CLOCK 133700, ,071787").
Expressions	Do not use expressions as parameters. An example of an expression is "(4+2*13)".
Units	Accepted units in command parameters are: A amperes DB decibels DBM decibels references to 1 milliwatt for ac voltage amplitude HZ hertz OHM ohms PCT percent PPM parts per million V volts

Syntax Rules (continued)

Multipliers	MA mega, or unit x 1,000,000) K kilo, or unit x 1,000) M milli, or unit ÷ 1,000; (except MOHM and MHZ) U micro, or unit ÷ 1,000,000) Examples: MOHM or MAOHM Megohms MHZ or MAHZ Megahertz MV millivolts MAV Megavolts MA millliamperes
Multiple Commands	To combine commands in one statement, use a semicolon (;). For example, instead of using these two statements: 20 PRINT @3,"OUT 100 MV" ! Select 100 mV dc 30 PRINT @3,"OPER" ! Activate the output You can accomplish the same with this single line: 20 PRINT @3,"OUT 100 MV ; OPER"
Terminators	Terminators sent by the 5720A: LF with EOI. Terminators received by the 5720A: LF or any character with EOI
Responses	The responses described in the command table are correct for IEEE-488 remote control, and for serial remote control in "COMPUTER" mode. In serial remote control in "TERMINAL" mode, responses contain more descriptive text intended for an operator using a terminal interactively.

Command Summary by Function

Error Mode Commands	
ADJOUT?	Returns adjusted output magnitude and frequency.
INCR	Increments or decrements the output
MULT	Multiplies reference by a value and establishes the product as a new reference.
NEWREF	Establishes a new reference.
OFFSET	Sets and enables or disables an offset.
OFFSET?	Returns the value of the present offset.
OLDREF	Sets the output to the present reference.
OUT_ERR?	Returns the UUT error computed by the 5720A.
REFOUT?	Returns the value of the present reference.
SCALE	Activates and deactivates scaling.
SCALE?	Returns scaling information.
SCAL_ERR?	Returns the scale error value if scaling is active.
Instrument Configuration Commands	
BTYPE	Selects an amplifier type for voltage or current boost.
BTYPE?	Returns the amplifier types set for voltage and current boost.
CLOCK	Sets the clock/calendar.
CLOCK?	Returns the setting of the clock/calendar.
CUR_POST	Selects active binding post for current output.
CUR_POST?	Returns active binding post for current output.
EXTGUARD	Opens and closes an internal connection. between GUARD and LO.
EXTSENSE	Opens and closes an internal connection between SENSE and OUTPUT.
FORMAT	Restores calibration constants and other parameters to factory defaults.
LIMIT	Sets positive and negative output limits.
LIMIT?	Returns the programmed positive and negative output limits.

*LRN?	Returns a list of commands that can duplicate the present state.
RANGE?	Returns the present output range.
RANGELCK	Locks the present range, or selects autoranging.
Output Commands	
BOOST	Activates or deactivates an auxiliary amplifier.
DBMOUT?	Returns the output amplitude and frequency, but in dBm if ac V.
OPER	Activates the 5720A output if it is in standby.
OUT	Sets the output and establishes a new reference for error mode.
OUT?	Returns the output amplitude and frequency.
PHASE	Sets the phase shift of the phase output signal.
PHASE?	Returns the phase shift of the phase output signal.
PHASELCK	Activates or deactivates phase locking to an external signal.
PHASESFT	Activates or deactivates variable phase output.
RCOMP	Activates or deactivates two-wire compensation circuitry.
STBY	Puts the 5720A in standby.
VOUT?	Returns the output amplitude in volts if the active units are dBm.
WBAND	Activates or deactivates the Wideband AC Module (Option 5700A-03).
General Functions	
*CLS	Clear; clears status registers, any service request, and flags.
ECHO?	Echoes a string to the remote port.
GAL	Go to Alternate Language; enters Fluke 5100B or 5200A emulation mode.
*OPC	Sets bit 0 in the ESR to 1 when pending operations are complete.

Command Summary by Function (continued)

*OPC?	Returns a "1" when all pending remote operations are complete.
*PUD	Stores a string of user-selected characters in non-volatile memory.
*PUD?	Returns the contents of the PUD memory.
RPT_STR	Loads the user report string.
RPT_STR?	Returns the user report string.
*RST	Resets the 5720A to its default power-up state.
UNCERT?	Returns the absolute uncertainty of the output.
*WAI	Halts program execution until pending operations are complete.
RS-232C Interface Parameter Setting Commands	
SP_EOF	Sets the End-of-File (EOF) string.
SP_EOF?	Returns the End-of-File (EOF) string.
SP_SET	Sets RS-232C interface parameters.
SP_SET?	Returns RS-232C interface parameters.
SP_TIME	Sets the time-out period.
SP_TIME?	Returns the time-out period.
5720A Calibration, Testing, and Diagnostics Commands	
CAL_ADJ	Does the internal portion of calibration.
CAL_CHK	Starts a calibration check.
CAL_CLST?	Returns a group of calibration constant names and their values.
CAL_CONF	Sets the specification confidence level to 95% or 99%.
CAL_CONF?	Returns the active calibration confidence level.
CAL_CONST?	Returns the value of a particular constant.
CAL_DATE?	Returns the date of the most recent calibration.
CAL_DAYS?	Returns number of days since last calibration recall.
CAL_INTV	Sets the calibration interval.
CAL_INTV?	Returns the calibration interval.

Command Summary by Function (continued)

CAL_PR	Prints a calibration report out the serial interface.
CAL_REF	Performs a calibration procedure using a 1½, 10 k½, or 10V standard.
CAL_RNG	Starts a self calibration procedure of a range.
CAL_RPT?	Returns a formatted calibration report.
CAL_SHIFT?	Returns the shift of a range due to calibration.
CAL_SLST?	Returns the shifts of a group of ranges.
CAL_STORE	Stores new calibration constants in nonvolatile memory.
CAL_TEMP	Sets the temperature for calibration.
CAL_TEMP?	Returns the calibration temperature last specified.
CAL_WBFLAT	Performs Wideband AC Module (Option 5700A-03) flatness calibration.
CAL_WBGAIN	Performs Wideband AC Module (Option 5700A-03) gain calibration.
CAL_ZERO	Performs internal zeros calibration.
DIAG	Runs self diagnostics.
DIAGFLT	Sets the 5720A response to faults in remote diagnostics.
DIAGFLT?	Returns the 5720A response to faults in remote diagnostics.
OHMSREF?	Returns a calculated resistance reference.
STOP_PR	Stops printing a report.
*TST?	Performs self tests and returns the results.
Serial Only Remote Commands	
LOCAL	Places the 5720A into the local state.
LOCKOUT	Places the 5720A into the local lockout state
REMOTE	Places the 5720A into remote state.
Status Commands	
*ESE	Loads the Event Status Enable register
*ESE?	Reads the Event Status Enable register.

Command Summary by Function (continued)

*ESR?	Reads and clears the Event Status Register.
ETIME?	Returns the time power has been on.
EXPLAIN?	Returning a brief description of a fault code.
FAULT?	Returns the most recent fault code from the fault queue.
*IDN?	Returns 5720A identification information.
ISCE	Loads Instrument Status Change Enable Register.
ISCE?	Reads Instrument Status Change Enable Register.
ISCR?	Reads and clears the Instrument Status Change Register.
ISR?	Reads and clears the Instrument Status Register.
ONTIME?	Returns the time elapsed since power-up.
*OPT?	Returns a list of installed modules and attached amplifiers.
*SRE	Loads the Service Request Enable Register.
*SRE?	Reads the Service Request Enable Register.
STATE?	Returns the long term state of the 5720A.
*STB?	Returns the status byte.

Commands

Command	Parameters	Response
ADJOUT?	None	1. (Float) Amplitude 2. (String) Units 3. (Float) Frequency
BOOST	ON or OFF	None
BTYPE	VB5725, VB5205, VB5215, IB5725, or IB5220	None
BTYPE?	None	1. (String) VB <model number> 2. (String) IB <model number>
CAL_ADJ	None	None
CAL_CHK	None	None
CAL_CLST?	CAL, CHECK, or PREV	1. (String) List (See manual.)
CAL_CONF	99 or 95	None
CAL_CONF?	None	CONF99 or CONF95
CAL_CONST?	1. CAL, CHECK PREV 2. Name of constant	(Float) Value of the constant
CAL_DATE?	B5725, CAL, WBFLAT, WBGAIN, or ZERO	(Integer) Date as MMDDYY

Commands (continued)

Command	Parameters	Response
CAL_DAYS?	B5725, CAL, WBFLAT, WBGAIN, or ZERO	(Integer) # of elapsed days since calibration
CAL_INTV	1, 90, 180, or 365	None
CAL_INTV?	None	(Integer) 1,90, 180, or 365
CAL_PR	CAL, CHECK, or RAW	None
CAL_REF	Value and units of external standard	None
CAL_RNG	1. range identifier, NULL or STORE 2. Calibration magnitude (Only if 1 is range id) 3. Frequency (Optional, and only if 1 is range id)	None
CAL_RPT?	CAL, CHECK, or RAW	1. (String) Formatted report
CAL_SHIFT?	1. CAL or CHECK 2. Range identifier	1. (String) Range info. (See manual.)
CAL_SLST?	CAL or CHECK	1. (String) Info. for all ranges. (See manual.)
CAL_STORE	None	None
CAL_TEMP	Temperature in °C	None
CAL_TEMP?	B5725, CAL, WBFLAT, WBGAIN, or CHECK	(Float) Temperature in °C.

Commands (continued)

Command	Parameters	Response
CAL_WBFLAT	START, NULL, or STORE	None
CAL_WBGAIN	PGAIN, NGAIN, or STORE	None
CAL_ZERO	None	None
CLOCK	1. 24-hour time as HHMMSS 2. Date as MMDDYY	None
CLOCK?	None	1. (Integer) Time as HHMMSS 2. (Integer) Date as MMDDYY
*CLS	None	None
CUR_POST	NORMAL, AUX, or IB5725	None
CUR_POST?	None	(String) NORMAL, AUX, or IB5725
DBMOUT?	None	1. (Float) Output value 2. (String) Units 3. (Float)Frequency
DIAG	ALL, D5700, DV5725, DI5725, CONT, or ABORT	None

Commands (continued)

Command	Parameters	Response
DIAGFLT	HALT, ABORT, or CONT	None
DIAGFLT?	None	(String) HALT, ABORT, or CONT
ECHO?	Any string	(String) Same string
*ESE	Decimal equiv. of 16-bit word (0-255 only)	None
*ESE?	None	(Integer) Decimal equiv. of byte
*ESR?	None	(Integer) Decimal equiv. of byte
ETIME?	None	(Integer) minutes powered on
EXPLAIN?	Fault code	(String) Explanation text
EXTGUARD	ON or OFF	None
EXTSENSE	ON or OFF	None
FAULT?	None	(Integer) The fault code
FORMAT	ALL, B5725, CAL, RNG, or SETUP	None
GAL	L5100	None
*IDN?	None	(String, string, string, string) Fluke, model #, serial #, main CPU s/w rev.+ inguard CPU s/w rev.+ BOOST CPU s/w rev.)

Commands (continued)

Command	Parameters	Response
INCR	± step size	None
ISCE	Decimal equivalent of 16-bit word	None
ISCE?	None	Decimal equivalent of 16-bit word
ISCR?	None	Decimal equivalent of 16-bit word
ISR?	None	Decimal equivalent of 16-bit word
LIMIT	1. Positive limit with unit 2. Negative limit with unit	None
LIMIT?	None	(Float, float, float, float) 1. Positive voltage limit 2. Negative voltage limit 3. Positive current limit 4. Negative current limit
LOCAL	None	None
LOCKOUT	None	None
*LRN?	None	(String) Re-configuration command
MULT	Multiplier expressed as a floating point number	None
NEWREF	None	None
OFFSET	ON or OFF	None
OFFSET?	None	1. (Float) Offset value 2. (Float) Offset units

Commands (continued)

Command	Parameters	Response
OHMSREF?	CAL, CHECK, or PREV	(Float) Resistance reference
OLDREF	None	None
ONTIME?	None	(Integer) Time unit is powered on (minutes)
*OPC	None	None
*OPC?	None	(Integer) 1
OPER	None	None
*OPT?	None	(Strings separated by commas)
OUT	Either one of the following is required. 1. (Optional) Amplitude or 2. (Optional) Frequency	None
OUT?	None	1. (Float) Amplitude 2. (String) Units 3. (Float) Frequency
OUT_ERR?	None	1. (Float) UUT error magnitude 2. (String) Units for above
PHASE	± phase in degrees	None
PHASE?	None	(Integer) Phase in degrees
PHASELCK	ON or OFF	None
PHASESFT	ON or OFF	None

Commands (continued)

Command	Parameters	Response
*PUD	(See manual for parameter.)	None
*PUD?	None	(See manual for response.)
RANGE?	None	(String) Name of range
RANGELCK	ON or OFF	None
RCOMP	ON or OFF	None
REFOUT?	None	1. (Float) Output 2. (String) Units 3. (String) Frequency
REMOTE	None	None
RPT_STR	String of up to 40 char.	None
RPT_STR?	None	(String) User report string
*RST	None	None
SCALE	ON or OFF	None
SCALE?	None	1. (Float) Nominal full-scale 2. (Float) Actual full-scale 3. (String) Units for above two
SCAL_ERR?	None	1. (Float) Scale error 2. (String) Units for scale error

Commands (continued)

Command	Parameters	Response
SP_EOF	1. First ASCII code 2. Second ASCII code	None
SP_EOF?	None	1. (Integer) First ASCII code 2. (Integer) Second ASCII code
SP_SET	1. 110, 300, 600,1200, 2400, 4800, (9600), or 19200 2. (TERM) or COMP 3. (XON), RTS, or NOSTALL 4. DBIT7 or (DBIT8) 5. (SBIT1) or SBIT2 6. PNONE, (PEVEN), PODD, or PIGNORE 7. CR, LF, or (CRLF)	None

Commands (continued)

Command	Parameters	Response
SP_SET?	None	1. (Integer) Baud rate 2. (String) TERM or COMP 3. (String) XON, RTS, or NOSTALL 4. (String) DBIT7 or DBIT8 5. (String) SBIT1 or SBIT2 6. (String) PNONE, PEVEN, PODD, or PIGNORE 7. (String) CR, LF, or CRLF
SP_TIME	0 - 30	None
SP_TIME?	None	(Integer) 0 - 30, seconds
*SRE	Decimal equiv. of byte	None
*SRE?	None	Decimal equivalent of byte
STATE?	None	(See manual for response.)
*STB?	None	Decimal equivalent of byte
STBY	None	None
STOP_PR	None	None
*TST?	None	(Integer) 0, pass; 1, fail

Commands (continued)

Command	Parameters	Response
UNCERT?	None	1. (Float) 5720A uncertainty 2. (String) Units for response 1 3. (Integer) Cal interval in days
VOUT?	None	1. (Float) amplitude 2. (String) Units 3. (Float) Frequency
*WAI	None	None
WBAND	ON or OFF	None

Operating State Transitions

From	To	Use	1722A GPIB Command	Serial Command
Local	Remote	MLA + REN	REMOTE	REMOTE
	Local/ Lockout	LLO + PEN	LOCKOUT	LOCKOUT
Remote	Local	GTL, or "GO TO LOCAL CONTROL" softkey	LOCAL	LOCAL
	Remote/ Lockout	LLO + REN	LOCKOUT	LOCKOUT
Local/ Lockout	Remote/ Lockout	MLA + REN	REMOTE or any 5720A command	REMOTE
Remote/ Lockout	Local	REN not	LOCAL	LOCAL
	Local/ Lockout	GTL	Manually using WBYTE	None

Status Register Summary

Register	Read Command	Write Command	Enable Register
Serial Poll Status Byte (STB)	STB? (or SPL () for 1722A)	None	SRE
Service Request Enable Register (SRE)	*SRE?	*SRE	None
Event Status Register (ESR)	*ESR?	None	ESE
Event Status Enable Register (ESE)	*ESE?	*ESE	None
Instrument Status Register (ISR)	ISR?	None	None
Instrument Status Change Register (ISCR)	ISCR?	None	ISCE
Instrument Status Change Enable Register (ISCE	ISCE?	ISCE	None

Status Register Summary (continued)

Serial Poll Status Byte and SRE Bit Definitions

7	6	5	4	3	2	1	0
0	RQS	ESB	MAV	EAV	ISCB	0	0
	MSS						

RQS For IEEE-488 remote control: Requesting service. The RQS bit is set to 1 whenever bits ESB, MAV, EAV, or ISCB change from 0 to 1 and are enabled (1) in the SRE. When RQS is 1, the 5720A asserts the SRQ control line. Perform a serial poll to read this bit to see if the 5720A is the source of an SRQ. (A serial poll also clears the RQS bit.)

MSS For serial remote control: Master summary status. Set to 1 whenever bits ESB, MAV, EAV, or ISCB are 1 and enabled (1) in the SRE. This bit can be read using the *STB? command.

ESB Is set to 1 when one or more enabled ESR bits are 1.

MAV Message available. The MAV bit is set to 1 whenever data is available in the 5720A's IEEE-488 interface output buffer.

EAV Error (fault) available. A fault has occurred and a fault code is available to be read from the fault queue by using the FAULT? query.

ISCB One or more enabled ISCR bits are 1.

Status Register Summary (continued)

ESR and ESE Bit Definitions

15	14	13	12	11	10	9	8
0	0	0	0	0	0	0	0

7	6	5	4	3	2	1	0
PON	0	CME	EXE	DDE	QYE	0	OPC

PON Power on. This bit is set to 1 if the power has been cycled since the last time the ESR was read.

CME Command error (fault). The IEEE-488 interface encountered an incorrectly formed command.(The command FAULT? fetches the earliest fault code in the fault queue, which contains codes for the first 15 faults)

EXE Execution error (fault). A fault occurred while the 5720A tried to execute the last command. This could be caused, for example, by a parameter being out of range. (The command FAULT? fetches the earliest fault in the fault queue, which contains codes for the first 15 faults that have occurred.)

DDE Device-dependent error (fault). A fault related to a device-dependent command has occurred. An example would be attempting to execute "OUT 1000000V", which is outside the range of the 5720A. (The command FAULT? fetches the earliest fault in the fault queue, which contains codes for the first 15 faults that have occurred.)

QYE Query error (fault). The 5720A was addressed to talk when no response data was available or appropriate, or when the controller failed to retrieve data on the output queue.

OPC Operation complete. All commands previous to reception of a *OPC command have been executed, and the interface is ready to accept another message.

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